"Deadlock" Societies, The Allocation of Time and Growth Performance

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December 8, 1991

Abstract

This paper deals with the relation between the nature of the political process and the growth performance of the economy.

We claim that the poor growth performance of many countries is a consequence of the misallocation of its human resources.

Growth is the consequence of deliberate efforts by entrepreneurs who try to increase their profits through innovation. We endogeneize the choice of time devoted to this activity vis a vis other ways of increasing income, i.e. through government subsidies. We provide an explicit technology for the allocation of government subsidies, a reduced form for the political system. Societies that allocate more resources through the political system will have lower growth rates. Furthermore the characteristics of the political redistribution mechanism will affect time allocation and therefore growth performance. For example as groups have a more unequal access to the political system fewer resources will be devoted to political fight since the outcome of the process is more certain. On the other hand, societies were the balance of power is more evenly distributed, will find themselves in a "deadlock" were a considerable amount of resources get spent on trying to affect government decisions.

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The CEO of the Argentine firm is so busy he has no time to work.[1]

1 Introduction

The endogenous growth literature[2] has broken the tie of growth to exogenous technological progress and has allowed to study the implications on growth performance of a wealth of variables which were previously ignored. In particular, the fact that some economies grow while others stagnate is no longer a puzzle for the theory. Additionally, models like Becker et al (1990), Murphy et al (1989) and Azariadis and Drazen (1990), have multiplicity of equilibria, in which initial conditions may determine whether a country takes off into steady growth or stays at a low level equilibrium. These results are a big step ahead, in that they enable us to explain differential growth performance between rich and poor countries. Yet, there are some cases where some of the observables (or variables usually included in growth regressions) would predict better growth than the observed. Latin American countries are a prime example of this. Continent dummies for Latin America (and for Subsaharan Africa) are found to be negative and significant by Barro (1991) and Alesina et al (1991) , among others.

It is our contention that this poor growth performance is explained by a misallocation of human resources, such as overgrown financial sectors in high inflation economies, information gathering and influence activities. This misallocation can take place both at the extensive (bodies) and intensive (time) margins. The extensive margin, high skilled people that get devoted to non-growth related activities is studied in Murphy et al, (1991) and Baumol (1990). This paper concentrates on the allocation of time, the intensive margin. We take as given the distribution of people across activities, in which the ablest people will be at the top of organizations (Rosen 1981), and look at the allocation of their time between influence activities and growth enhancing activities.

The importance of the misallocation of entrepreneurial time is described in De Pablo and Martinez (1989), who provide a stylized version of the typical day in the life of an Argentine CEO :

> He wakes up at 6:30, ..., turns on the radio in order to listen to portions of three-hour news and interview programs. In these programs the new of the newspaper he is about to read ... are updated with telephone calls to key officials, businessmen, analysts, etc.. While having breakfast he reads two general papers and two papers specialized in economics.
>
> As soon as he arrives to the office, ..., he will check with his managers to confirm that he correctly understood what he read or heard, and would start his office day. This typically will include a working luncheon, to listen to a public official, or a political or economic analyst, plus meetings with ministers or high officials in charge of price, exchange rate, or wage controls, authorizations for entry in a market or tax incentives for investments, etc., plus meetings with "competitors", to unify positions in a petition to authorities...

Following Grossman and Helpman (1991), we envision growth as a process in which there is constant improvement in the quality or technology for producing goods. This

[1] De Pablo and Martinez, (1989).

[2] For example Lucas (1988), Rebelo (1991), Sala-i-Martin (1991a) (1991b), Barro (1990), Romer (1990).

improvement is the consequence of deliberate effort by producers who try to obtain a market niche over which to exert monopoly power. Our model endogeneizes the choice of time devoted to this activity vis a vis other ways of increasing income, i.e. through government subsidies. We provide an explicit technology for the allocation of government subsidies, a reduced form for the political system. We show that societies that allocate more resources through the political system will have lower growth rates. Furthermore the characteristics of the political redistribution mechanism will affect time allocation and therefore growth performance. For example as groups have a more unequal access to the political system fewer resources will be devoted to political fight, since the outcome of the process is more certain. On the other hand, societies were the balance of power is more evenly distributed, will find themselves in a "deadlock" were a considerable amount of resources get spent on trying to affect government decisions.

We also show that the relative intensities of rent-seeking effort will depend on whether asymmetries are in the nature of a price or of an income effect. When one sector has a comparative advantage in the access to the political game, this sector will specialize in that activity. When the bias in the system is "ideological", or independent of lobbying intensities, the less favored sector will spend more time trying to compensate for such bias.

In our model, the political system and policy decisions have an important effect on growth performance. In this vein, we agree with the literature that emphasizes that "policy matters", as in Rebelo (1991) and Fischer (1991). Rebelo and Fischer emphasize the effects of taxation and of macroeconomic policy, respectively. Without disagreeing with them, we want to emphasize the complementary problems introduced by macroeconomic instability (you need to devote time to figure out the value of relevant macroeconomic variables like inflation, otherwise you may suffer capital lossses of an order of magnitude bigger than operating profits), policy uncertainty (you delay investment until knowing the new set of relevant prices, and you don't want to commit yourself to a production technique that may be non-optimal at future relative prices), and "weakness of governments"[3] who are susceptible to be influenced by rent seeking activities. The later problem is the one we model explicitely.

The next section describes the model. Sections 3 and 4 show the solution to the model for the case of symmetric access to the polity. Sections 5 and 6 analyze the asymmetric case. Section 7 concludes the paper.

2 The Model

The economy produces two goods, x and y. While the product space is constrained in the dimension of the number of goods, we allow for improvements in the quality of both commodities.[4] This corresponds to viewing the process of growth as a Schumpeterian model of technological progress in which technological breakthroughs increase the consumption possibilities of the economy. We denote quality as q_m^x and q_m^y where m indicates the generation to which the product belongs. Goods belonging to superior generations can be interpreted as giving a higher level of utility or as being producible at a lower cost. Each

[3] Borrowing the terminology of Edwards and Tabellini (1991).

[4] The basic specification follows closely that of Grossman and Helpman (1991).

product is more advanced than that of the previous generation by a constant value μ. This is true both for x and y goods.

At each point in time, there are two firms in each sector, which master different technological qualities. As we will see, only the most advanced firm or "state of the art" will produce at each time. The other which we will call "follower" will be engaged in research activities aimed at obtaining the technological lead and dominating the market. In equilibrium the successful innovator will take over production, and will reap off the benefits of a temporary monopoly power (until he himself is outdated), which justifies the initial sunk cost of spending in technological development.

The economy is inhabited by N workers with utility function:

$$\sum_{t=0}^{\infty} \beta^t (logD_t + w(1 - h_t)) \tag{1}$$

with

$$logD_t = log(\sum_m q_m^x x_m) + log(\sum_m q_m^y y_m) \tag{2}$$

where h_t is the fraction of time devoted to work. The formulation of D_t implies that all goods in the same product line are perfect substitutes, and therefore the consumer will choose such goods with the lowest quality adjusted price. In addition the elasticity of substitution between both commodities is equal to one, due to the additive log specification.

Workers maximize (1) subject to an intertemporal budget constraint where income is given by wage earnings.

Each industry is composed of two self-employed high-skill entrepreneurs. Entrepreneurs maximize the utility function:

$$\sum_{t=0}^{\infty} \beta^t logD_t \tag{3}$$

where $logD_t$ is defined as in (2), subject to their wealth. Their wealth equals the expected present value of the profit stream from their firms. The firm has two sources of income: product market profits and subsidies from the government (received if successful in its lobbying effort).

We show below that at each moment, there will only be one active producer ("the leader") per sector. The entrepreneur is endowed with one unit of skilled labor. While engaged in production, this unit is devoted to monitoring of production workers. While a follower, this unit is allocated between activities directed towards technological advance (R&D), and efforts to influence the allocation of funds (subsidies) through the political system.

There are three "technologies" in this economy. We describe each one in turn. First, goods are produced using only labor with unit labor requirements.

Second, in order to obtain a probability ι of a technological breakthrough, $a\iota$ units of skilled labor have to be devoted to R&D. The input requirement a is assumed to be greater than one.Also, each new technological generation is superior to the previous, by the amount $\mu > 1$.

Finally we describe the technology for the allocation of the subsidy S by the government. The sector that receives the subsidy S,[5] is that which exerts the maximum amount of pressure in the political arena. the losing sector will pay the bill. The assignment mechanism is a rank order tournament (Lazear and Rosen 1981), in which each sector devotes resources (managerial time) to maximize the probability of winning the bid. The effective amount of pressure by each sector j, L_j equals:

$$L_j = l_j + \epsilon_j \tag{4}$$

where l_j is the output of lobbying time produced with bl_j units of skilled labor, and ϵ_j is an error term that reflects shocks to the political system or instrument uncertainty, unknown at the time of deciding l_j. We will assume ϵ_j to be normally distributed with mean zero and variance $\frac{\sigma^2}{2}$. The subsidy is allocated according to:

$$S_x(l_x, l_y) = \begin{cases} -S & \text{if } L_x \leq L_y \\ S & \text{if } L_x \geq L_y \end{cases}$$

so that the probability of sector x obtaining the subsidy is given by the probability that

$$\eta < l_x - l_y \tag{5}$$

where $\eta = \epsilon_y - \epsilon_x$ is normally distributed, with mean zero and variance σ^2.

This battle is repeated every period by the two followers. The subsidy (positive or negative) is valid for the duration of the monopoly position, [6] if the technological improvement is obtained the period following each political battle.

Notice that although the government budget is balanced on average, it needs not be balanced every period. We assume the government borrows or lends to cover up for temporarily running budget deficits and surpluses.

3 Equilibrium

From (1) and (2), the "intratemporal" demand for each commodity will equal:

$$d_j = \frac{E_t}{2p_j} \tag{6}$$

[5] S has an upper bound which is given by the fact that we require that the producer who has achieved a technological breakthrough and who will be *charged* the subsidy, be willing to enter.

[6] The subsidy is "rationalized" as encouraging R&D, since it is given to technological leaders.

where $E(t)$ equals total nominal spending at time t and $j = x, y$. This demand applies to workers and entrepreneurs alike. This, plus the fact that preferences are homothetic in x and y, imply that (6) also represents aggregate demand.

This specification also allows for an easy characterization of the intertemporal problem. The logarithmic utility function implies that the consumer will choose a pattern of expenditure such that:

$$E_t = \beta(1+r)E_{t+1} \tag{7}$$

Producers in the same product line engage in Bertrand competition. Different qualities of the same product are perfect substitutes by (2). The implication is that the leader or state of the art producer will charge a quality adjusted price slightly below the reservation price of the competitor which is the wage rate w^* ie. his marginal cost. In equilibrium therefore the follower will not engage in production.

The demand function becomes completely elastic at price μw^* or at

$$q = \frac{E}{2\mu w^*} \tag{8}$$

The equilibrium price in the product market will then be $w^*\mu$ and Bertrand profits will equal :

$$B = pq - w^*q = (\mu - 1)w^*\frac{E}{2w^*\mu} = (1 - \frac{1}{\mu})\frac{E}{2} \tag{9}$$

Unskilled labor is hired for production purposes . The supply of labor is perfectly elastic at the constant marginal disutility of work w. The derived demand for labor is flat and equal to μw^* up to the quantity $\frac{E}{2\mu w^*}$ and zero afterwards, due to the unitary elasticity assumption. The equilibrium wage is $w^* = w$. Notice that only L units of labor get hired while the remaining (N-L) workers consume leisure and no commodities.

The interest rate r gets determined in the capital market. The employed workers have a smooth path of income, and therefore will only go to the capital market if the interest rate differs from the discount factor. Entrepreneurs' income fluctuates over time, as in some periods they will be earning profits and in some periods they will be doing research and lobbying. They will borrow during the nonproductive periods and will lend in the profit making periods. In addition the government plays a critical role in the capital market, demanding funds when its net subsidies are positive and viceversa. For society as a whole, expenditure will equal income at any point in time. Given that aggregate income is constant, substituting in (7) we determine the interest rate from:

$$\beta = \frac{1}{1+r} \tag{10}$$

4 The Allocation of Time

The entrepreneur's problem consists in allocating his unit of skilled labor between research (or innovation oriented thinking) activities which increase the probability of a technological jump, and lobbying effort which increases the probability of receiving a government subsidy. He maximizes the value of the firm, which equals:

$$V_j = \iota_j \frac{B + ES_j(l_j, \bar{l_j})}{1 - \beta(1 - \bar{\iota_j})} \tag{11}$$

for a firm in sector j. The value of the firm is the present discounted value of the stream of income. The firms receives Bertrand profits and (receives or pays) government subsidy after achieving a technological breakthrough. This happens with probability ι_j in which case the producer becomes the leader obtaining a per period profit of B (the Bertrand profit) plus the expected subsidy until displaced. The discount factor includes the probability of being displaced as leader in the future which equals $\bar{\iota_j}$, the research intensity of the other firm in the same industry. The value of the firm, is maximized subject to:

$$1 = bl_j + a\iota_j \tag{12}$$

The parameter $b > 1$ is the inverse of the lobbying efficiency of the sector. We assume initially that this productivity is equal for both sectors, which generates a symmetric equilibrium. We will look at the Nash Equilibrium in the dual game across industries for the subsidy and within industry for technological leadership.

The first order conditions for the firm in sector j are:

$$\frac{B + ES_j(l_j, \bar{l_j})}{1 - \beta(1 - \bar{\iota_j})} = \lambda_j a \tag{13}$$

$$\frac{i_j}{1 - \beta(1 - \bar{\iota_j})} \frac{\partial ES_j(.)}{\partial l_j} = \lambda_j b, \tag{14}$$

plus the budget constraint (12).

The expected subsidy for sector x is:

$$ES_x = [2Prob(\eta < l_x - l_y) - 1]S = [2\Phi(l_x - l_y) - 1]S \tag{15}$$

and

$$\frac{\partial ES_x}{\partial l_x} = 2S\phi(l_x - l_y) \tag{16}$$

where Φ is the distribution function, and ϕ its corresponding density.

For the case of a normal distribution, we solve for the symmetric equilibrium, same ι and same l, which implies evaluating the normal density at zero, we obtain:

$$\iota = \frac{b}{a}\frac{B}{S}\sqrt{\frac{\pi}{2}}\sigma \tag{17}$$

Therefore in equilibrium the amount of time devoted to research increases with research productivity, decreases with lobbying productivity and increases with the size of Bertrand profits.

Equation (17) is valid only for an interior solution. Research intensity ι is constrained to be smaller than $\frac{1}{a}$ from (12). This implies that for $\frac{S}{B}$ smaller than $b\sqrt{\frac{\pi}{2}}\sigma$ all effort will be devoted to R&D. Increases in S will not affect this value until we fall again in the interior solution region. Further increases in S will decrease the amount of R&D and will therefore deteriorate the growth performance of the economy.

Additionally, in order to insure that the sector which lost political bid be willing to enter and pay the subsidy, we have to impose an upper bound on $\frac{S}{B}$. This condition requires that the value of entering and receiving $B - S$ be larger than the value of waiting an additional period in which case the expected subsidy is zero.[7]

The growth rate of the economy is measured by the growth of the consumption index D_t. This rate of growth is stochastic, so that we compute its expectation, $g = E(logD_{t+1} - logD_t)$. Given that technological improvements in each period follow a Bernoulli distribution with success probability ι, the level of technology over time follows a binomial distribution in which the expected number of increments in t periods equals the probability of success times the number of periods. The logarithm of the consumption index is:

$$logD_t = logxy + logq_t^x + logq_t^y \tag{19}$$

Starting with a quality level of q_0 for both products the expected value of quality in period t equals:

$$Elogq_t = logq_0 + \iota t log\mu \tag{20}$$

so that

$$g = 2\iota log\mu \tag{21}$$

We are now in a position to state some of our main comparative static results.

Equation (17) relates the rate of innovation to the parameters of the economy, and (21) relates ι to the growth rate.

The amount of research and development effort and the growth rate of the economy increase with the productivity of R&D (lower a, the input requirement in the research technology) and decrease with improvements in the productivity of lobbying effort (lower b). The amount of research decreases with the fraction of resources allocated in the political system.

[7]This participation constraint is:

$$\frac{S}{B} - \left(\frac{S}{B}\right)^2 \geq \beta\frac{b}{a}\sqrt{\frac{\pi}{2}}\sigma \tag{18}$$

As long as a is sufficiently large, (or β not too large) this imposes just an upper bound on $\frac{S}{B}$.

Equation (17) also shows that an increase in the variance of the shocks to the political allocation process (σ) makes the outcome of influence activities less certain and therefore reduces the incentive to engage in lobbying. This substitution increases the amount of resources devoted to research, increasing the probability of obtaining quality improvements and increasing growth.

In the extreme case of a very high σ the political allocation process is so uncertain that it is not worth spending effort in trying to influence the outcome. The political process is uncertain because of the actions and interactions of the many actors in political arena, not modeled here. Sudden changes in public opinion, arrival of information, etc. which are unknown at the moment of deciding on lobbying effort increase the uncertainty of the process. An alternative interpretation would be that, given the political outcome, the ability of the government to implement this redistribution may not be perfect. The policies required to implement this redistribution are not the simple subsidy-cum-tax scheme used above. In the real world, redistribution is achieved through complicated mechanisms such as: regulatory policy, price controls, distortionary taxation, exchange rate policies,etc. All of these measures are subject to a variety of shocks, which make the implementation not completely certain.

5 Asymmetric Equilibria

We move now to the analysis of the case where the access to the political system is asymmetric. There are two ways in which we incorporate this asymmetry into the model. On the one hand some groups may have comparative advantage at political activity. This captures the well known results in the Public Choice literature (Buchanan and Tullock 1962, Olson 1965, Stigler 1971, Peltzman 1976) by which some smaller, better organized or more homogeneous groups have more political leverage than others. In our model, this is captured by having $b_x \neq b_y$, i.e. different productivity parameters in the lobbying production function. This is analogous to a change in the relative price of lobbying vs R&D for both sectors. We call this the "leverage effect".[8]

On the other hand, there may be a systematic component in the subsidy allocation scheme. This may be thought of as all permanent (or known) biases in the decision process for the government. While η captured the transitory (or unknown) shocks to the political system, here we introduce a bias such that at equal lobbying efforts one group has a higher probability of obtaining the subsidy. This is analogous to a change in relative expected income and we call it "income" effect. This tries to capture characteristics of the political environment, known to the groups when deciding on their lobbying efforts, such as public opinion, efficiency considerations (Becker 1983), ideological positions, etc., which make one sector a favorite.

In this section we study the effects of the two types of asymmetry on the relative rent seeking intensities of the two groups. The next section studies the effect on aggregate lobbying effort and on growth performance. The methodology for this section is as follows. First, the first order conditions for the entrepreneur problem are modified to incorporate

[8] A similar result is obtained by letting $a_x \neq a_y$.

sector specific b's. Each set of 3 FOC can be simplified to one equation which implicitly defines a reaction function: $l_x(l_y)$ and $l_y(l_x)$ respectively. Combining the two reaction functions, a sign for $l_x - l_y$ is obtained for each case, leading to Lemmas 1 and 2.

5.1 Leverage Effect

We assume here that $b_x < b_y$, ie., that sector x is stronger in the political arena. The optimization problem for the individual entrepreneur is as before. Only that now in equations (11), (12), (13) and (14) we have to add the appropriate subindexes (x or y) in b. The equilibrium is now characterized by a system of 6 equations in 6 unknowns. The equations are 3 first order conditions for each producer type. Substituting the budget constraints in the two first order conditions for both agents, taking the ratio of the first order conditions, and then the ratio across agents we obtain:

$$(\frac{\iota_y}{\iota_x})\frac{B + ES_x}{B - ES_x} = \frac{b_y}{b_x} \tag{22}$$

The right hand side of (22) is greater than one. If $\iota_x > \iota_y$ (or equivalently $l_x < l_y$) then $ES_x < 0$, but this would imply the left hand side lower than one, a contradiction. Therefore from (22) we see that $b_x < b_y$ implies $l_x > l_y$, $\iota_x < \iota_y$ and $ES_x = -ES_y > 0$. This can be summarized in the following Lemma.

Lemma 1 The sector with more muscle in the political allocation will devote more time to this activity and less time to growth enhancing investment than the other. Consequently, it will receive the subsidy more often, and hence its expected subsidy is positive.

In this setup the two sectors will grow at different rates. We can still compute the rate of growth of the economy, which is:

$$g = (\iota_x + \iota_y) log\mu \tag{23}$$

5.2 Income effect

Here we return to the case in which $b_x = b_y$, but now the allocation of the subsidy becomes:

$$S_x(l_x, l_y) = \begin{cases} -S & \text{if } L_x + \Delta \leq L_y \\ S & \text{if } L_x + \Delta \geq L_y \end{cases},$$

which means that there is a permanent and known political bias in favor of sector x. Now the expected subsidy for sector x can be computed as:

$$ES_x = [2\Phi(\eta < l_x - l_y + \Delta) - 1]S \tag{24}$$

Making the appropriate substitutions in (13) and (14), and dividing them we obtain:

$$\frac{\frac{B}{S} + 2\Phi(l_x - l_y + \Delta) - 1}{(1 - bl_x)2\phi(l_x - l_y + \Delta)} = \frac{1}{b} \tag{25}$$

$$\frac{\frac{B}{S} - 2\Phi(l_x - l_y + \Delta) + 1}{(1 - bl_y)2\phi(l_x - l_y + \Delta)} = \frac{1}{b} \tag{26}$$

for x and y respectively. Equations (25) and (26) implicitly define two reaction functions. These reaction functions are upward sloping, reflecting the strategic complementarity of lobbying efforts, and intersect only once characterizing a stable equilibrium.

Dividing (25) and (26) we obtain:

$$\frac{B + (2\Phi(l_x - l_y + \Delta) - 1)S}{B - (2\Phi(l_x - l_y + \Delta) - 1)S} = \frac{B + ES_x(l_x, l_y, \Delta)}{B - ES_x(l_x, l_y, \Delta)} = \frac{\iota_x}{\iota_y} \tag{27}$$

Equation (27) implies that the sign of ES_x is the same as that of $\iota_x - \iota_y$ or equivalently that of $l_y - l_x$. On the other hand, we know that the expected subsidy to sector x is positive if and only if $l_x - l_y + \Delta > 0$; but then $ES_x > 0$ will contradict (27). From there, we know that $\Delta > 0$ implies $ES_x > 0$ and $l_x < l_y$. This result is summarized in the following lemma.

Lemma 2 The sector which is more favored by the political system, independently of the lobbying input, will exert less lobbying effort than the other, but will still be more likely to receive the subsidy.

Notice that this is different from the result of the previous exercise. There the favorite sector ended up devoting more time to pressure activities. That was induced by a substitution effect: if you are more efficient in the political arena you spend more time in that activity. Here, an income effect (you are more likely to win no matter how much effort you devote) induces the favorite group to spend part of this "income" in the other activity, therefore reducing the total amount spent on pressure activities.

6 The "Deadlock" Society

The previous section showed that the time allocation of each group will be different in an asymmetric equilibrium. In the case where the asymmetry is due to different "productivities" in the political process, the sector with a comparative advantage in lobbying will specialize in that activity. In the case where the bias in the political system is independent of the time input (income effect), the favored sector will spend less time seeking political favors than the other.

We also know from equation (23) that growth depends positively on the sum of research intensities (negatively on the sum of lobbying intensities). The crucial question to understand the effect of asymmetries in the political process on growth, is whether aggregate lobbying increases or decreases as the degree of symmetry changes. In this section we answer that question.

The methodology this time consists of applying the implicit function theorem to the system of two reaction functions, in order to obtain a comparative static result on $l_x + l_y$ as function of the asymmetry parameters.

For the case of an asymmetry due to the leverage effect we consider a mean preserving change in the political productivities. In the previous section b_j represented the input requirement coefficient for each sector j, productivity being $\frac{1}{b_j}$. We define:

$$\frac{1}{b_x} = b + \delta \tag{28}$$

$$\frac{1}{b_y} = b - \delta, \tag{29}$$

δ being the parameter we will vary in order to capture increased asymmetry. Making the appropriate substitutions in the first order conditions (13) and (14) we obtain:

$$\frac{\frac{B}{S} + 2\Phi(l_x - l_y) - 1}{(1 - b_x l_x)2\phi(l_x - l_y)} = \frac{1}{b_x} \tag{30}$$

$$\frac{\frac{B}{S} - 2\Phi(l_x - l_y) + 1}{(1 - b_y l_y)2\phi(l_x - l_y)} = \frac{1}{b_y} \tag{31}$$

Using (30) and (31) and applying the implicit function theorem we obtain:

$$\frac{\partial l_x}{\partial \delta} + \frac{\partial l_y}{\partial \delta} = \frac{2\phi'(l_x - l_y)\frac{a}{b}(\iota_x + \iota_y)}{3\phi(l_x - l_y) - \phi'(l_x - l_y)\delta a(\iota_x + \iota_y)} \tag{32}$$

For the case of an asymmetry due to a change in Δ we use equations (25) and (26) and applying the implicit function theorem we obtain:

$$\frac{\partial l_x}{\partial \Delta} + \frac{\partial l_y}{\partial \Delta} = \frac{\phi'(\bar{\eta})\frac{a}{b}(\iota_x + \iota_y)}{3\phi(\bar{\eta}) + \phi'(\bar{\eta})(l_x - l_y)} \tag{33}$$

where $\bar{\eta} = l_x - l_x + \Delta$.[9]

Equations (32) and (33) are valid for any distribution function Φ. They show that if η is uniformly distributed the total level of effort is invariant to the degree of asymmetry because $\phi' = 0$. If η is normally distributed, then the total level of effort is negatively related to Δ (or δ) which means that more asymmetry induces lower aggregate lobbying and therefore higher growth.

We are now in a position to state one of our main results, which we summarize in the following proposition.

Proposition For all distributions such that $\phi'(u) < 0$ for $u > 0$, the rate of growth of the economy will be negatively related to the degree of symmetry in the political allocation process.

Proof

1. $b_x \neq b_y$ case:

From Lemma 1 we know that $l_x - l_y$ when $\delta > 0$. If $\phi'(u) < 0$ for $u > 0$ then from (32) $\frac{\partial l_x}{\partial \delta} + \frac{\partial l_y}{\partial \delta} < 0$.

[9] Do mean preserving spread over ϕ.

2. $\Delta \neq 0$ case:

From Lemma 2 we know that $\bar{\eta} > 0$ and that $l_x - l_y < 0$ when $\Delta > 0$. If $\phi'(u) < 0$ for $u > 0$ then from (33) $\frac{\partial l_x}{\partial \Delta} + \frac{\partial l_y}{\partial \Delta} < 0$. □

Interestingly, even though the two types of asymmetry have different implications for **relative** lobbyng efforts, they have the same implication in terms of **aggregate** effort and growth performance.

The proposition shows that the higher the Δ (or δ), the smaller is the aggregate incentive to engage in rent seeking activities. The marginal benefit of lobbying is equal to the increase in the probability of receiving the government subsidy (ϕ), times the gain in income ($2S$). This benefit, therefore is highest for larger values of the density function. In the case of distributions such as the standard normal, the value of the density falls as the absolute value of the random variable increases. In such case the marginal benefit of lobbying activities decreases as we move away from zero. In the symmetric equilibrium, the density was evaluated at zero, and hence the incentive to lobby was at its maximum. This latter equilibrium is that which we refer to as the "deadlock" situation, where equally shared access to the political process induces an outcome with the highest use of entrepreneurial skill for activities not conducive to growth.

The intuition of this result is similar to that in Lazear and Rosen (1981). In that paper, when workers within a firm are different from each other, a handicap system (giving higher prizes to lower ability workers) elicits the optimal amount of effort. If prizes were kept constant, there will be a disincentive to work since the winner of the contest will be almost certain. Within the context of our model, a big Δ (or δ) implies asymmetry without handicap, which lowers the aggregate incentive to devote resources to the political contest.

We interpret high δ economies as those in which one sector has an easier access to the political process. This may be due, for example, to lower free-rider problem in smaller and more homogeneous sectors.

We interpret high Δ economies as those economies in which the pattern of subsidies is fairly well established, and in which the society has clearly picked a winning sector. Alternatively in low Δ economies it is not clear who are the winners and every group sees a chance of obtaining government privileges. We have shown above that the later economies would have a worse growth performance.

Our result formalizes the intuition that as we make one of the two sectors a clear winner, the incentive for both sectors to do lobbying decreases. Consider for example a case in which with almost certainty sector x, receives the subsidy. In this case, there is little incentive both for x and sector y, to lobby at all.

It has been argued that some Latin-American economies are in a situation where many resources are spent on lobbying. We think this is not only because these are high S societies (meaning that an important fraction of resources get allocated through the political system), but also because the power structure is such that every group perceives it has a chance of exacting a sizable amount of resources from the government. Concern about entrepreneurs that "work" not in their factories but in their corresponding ministries, has been well known for years. We think our model, captures this "deadlock" situation, were the economy is spending much of its entrepreneurial resources in a useless fight for government

protection. (Chile before 1973, Turkey before 80's, Peru with Alan Garcia, etc.?)

Remember that this comparative statics is performed for a given $\frac{S}{S+B}$, the fraction of resources distributed through the political system. What our result means is that for a given level of redistribution, the more biased the political system is in favor of particular groups, fewer resources will be spent in trying to influence the outcome of such process.

7 Conclusions

This paper explores the implications of some characteristics of political redistribution processes on growth performance.

Societies that allocate a higher fraction of resources through the political or non market system, will suffer from a lower growth rate, because much of their stock of entrepreneurial talent will be used to influence government decision and or to anticipate government policy. It is a "folk theorem" of Latin American economics that it is easier to get richer by influencing or anticipating the government than by technological improvements, cost reductions, brand development, etc.

An increase in the variance of the shocks to the political allocation process (σ) makes the outcome of influence activities less certain and therefore reduces the incentive to engage in lobbying. This increases the amount of resources devoted to research, increasing the probability of obtaining quality improvements and increasing growth.

In the extreme case of a very high σ the political allocation process is so uncertain that it is not worth spending effort in trying to influence the outcome. The political process is uncertain because of the actions and interactions of the many actors in political arena, not modeled here or alternatively due to instrument uncertainty in the implementation of redistributive policies. Political systems in which the number of independent decision makers in the political body is larger, may be characterized by a higher uncertainty on decisions. Similarly for a given size of the decision making body, the higher the correlation across votes (for example due to party discipline), the smaller will this variance be.

In addition, we show that the aggregate level of resources spent on deciding the political redistribution will be directly related to the symmetry in the access to the political game. This is to say that for a given level of redistribution, growth rates will be negatively related to the degree of symmetry. When policy makers are highly "ideologized" there are more likely to favor one sector independently of influence activities. In that case we expect to observe a lower aggregate effort to convince the government on the direction of policy.

The effect on the relative lobbying efforts depends on the nature of the asymmetry. If the asymmetry comes through different productivities in the political arena, then the sector who has a comparative advantage, will be the one who will specialize in influencing the government, as predicted by the public choice literature. On the contrary, if the degree of asymmetry comes because of an established bias in favor of one particular sector, then the losers will exert more effort than the winners in gaining government favor.

Even though we have framed our discussion in the context of time allocation to influence activities, we believe the results extend to a wealth of alternative interpretations. For example, economies with unstable macroeconomic policies, will induce entrepreneurs to spend most of their time trying to keep informed on the relevant variables for decision

making. The fact that being ahead of others is what matters in financial decision making, is what gives plausibility to our rank order setup, even for studying the extent of effort devoted to information acquisition. Many firms realize that they have much more to gain or to lose, by correctly anticipating economic policy than by increasing the efficiency of their operations.

The next steps to be taken in this research effort are in two (complementary) directions. First, we should try to implement empirically some of our key parameters. "Promotion schemes" so prevalent in Latin America may be a way of capturing S. How these schemes change through time is an indicator of the variability of the political process.

On the other hand, there is always the more primitive question: Where do these allocation processes come from? What "fundamentals" of different societies induce some governments to be actively involved in redistribution schemes which represent an important fraction of income? What political institutions can be linked to our parameterization?

These are fascinating questions. Further work is certainly required, but we have provided a start by linking several characteristics of the political technology and the growth rate of the economy.

8 References

Alesina, A., Ozler, SD., Roubini, N. and Swagel, P. (1991) "Political Instability and Economic Growth." Mimeo.

Azariadis, C. and Drazen, A. (1990); "Threshold Externalities in Economic Development." it Quarterly Journal of Economics 105, 501-526.

Barro, R. (1990); "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy* 98, S103-S125.

Barro, R. (1991); "Economic Growth in a Cross Section of Countries" *Quarterly Journal of Economics*, Vol 106, Issue 2, pp. 407-444.

Baumol, W. (1990); "Entrepreneurship: Productive, Unproductive, and Destructive." *Journal of Political Economy* 98, 893-921.

Becker, G. (1983); "A Theory of Competition Among Pressure Groups for Political Influence", *Quarterly Journal of Economics*, 98, 371-400.

Becker, G., Murphy, K. and Tamura, R. (1990); "Human Capital, Fertility, and Economic Growth." *Journal of Political Economy* 98, S12-S37.

Buchanan, J. and Tullock, G. (1962); *The Calculus of Consent: Logical Foundations of Constitutional Democracy*, Ann Arbor, University of Michigan Press.

De Pablo, J. and Martinez, A. (1989); *Argentina: A Successful Case of Underdevelopment Process.* Argentina.

Edwards, S. and Tabellini (1991); "Political Instability, Political Weakness and Inflation: an Empirical Analysis", NBER Working Paper 3721.

Fischer, S. (1991); "Growth, Macroeconomics and Development." NBER Working Paper 3702.

Grossman G. and Helpman E. (1991); *Innovation and Growth in the Global Economy*, MIT Press, Cambridge, MA.

Lazear, E. and Rosen, S. (1981); "Rank Order Tournament as Optimum Labor Contracts" *Journal of Political Economy*, Vol 89, 841-864.

Lucas, R. (1988); "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Vol 22, pp. 3-42.

Murphy, K., Shleifer A. and Vishny, R. (1991); "The Allocation of Talents: The implications for Growth" *Quarterly Journal of Economics*, Vol 106., Issue 2, pp. 503-530.

Murphy K., Shleifer, A. and Vishny, R. (1989) Industrialization and the Big Push., *Journal of Political Economy*, Vol 97, No 5. 1003-1026.

Olson, M. (1965); *The Logic of Collective Action*, Harvard University Press, Cambridge, MA.

Peltzman, S. (1976); "Toward a more general Theory of Regulation", *Journal of Law and Economics*, 19, 211-240.

Rebelo, S. (1991); "Long Run Policy Analysis and Long Run Growth", *Journal of Political Economy*, Vol. 99, No 3, pp. 500-521.

Romer, P. (1990); "Endogenous Technological Change." *Journal of Political Economy* 98, S71-S102.

Rosen, S. (1981); "The Economics of Superstars." it American Economic Review 71, 845-858.

Sala-i-Martin, X. (1990); " Lectures on Economic Growth". NBER Working Paper No. 3563.

Sala-i-Martin X. (1990); "Lectures on Economic Growth". NBER Working Paper No. 3564.

Stigler, G. (1971); "The Theory of Economic Regulation", *Bell Journal of Economics*. Spring Issue.